

AMENDMENTS TO THE SPECIFICATION

Please replace the paragraph starting on page 11, line 2 with the following rewritten paragraph:

The present invention is a fastening system for bone screws used in spinal fixation systems for reshaping the spine of a patient. The bone screw has threads on one end for anchoring in the spine. The other end has a spherical connector with a conical cavity therein. The cavity has the larger diameter base of the cone toward the threaded end of the screw and a narrower mouth. The mouth of the conical cavity accepts the spherical end of a toggle bolt such that the toggle bolt and the bone screw are connected by a ball joint. To prevent disassembly of the bone screw and toggle bolt, an associated split retention ring locking mechanism is inserted in the conical cavity between the spherical end of the toggle bolt and the mouth of the cavity. The resilient split retention ring can be compressed to reduce ~~[[it's]]~~ its diameter for insertion through the mouth of the cavity and then expands to fill the conical cavity superior to the spherical end of the toggle bolt.

Please replace the paragraph starting on page 18, line 10 with the following rewritten paragraph:

Now with reference to Figure 1, the spinal fixation system 10 of the present invention is shown. By way of overview, the ~~Fixation System~~ fixation system 10 includes a collection of polyaxial bone-anchoring assemblies 12 that are joined via

connectors 14, 14' to stabilizing rods 16, 16'. The specifics of the spinal fixation system 10 will now be discussed in more detail.

Please replace the paragraph starting on page 18, line 16 with the following rewritten paragraph:

With additional reference to Figures 2 and 3, ~~illustrate~~ two common types of polyaxial anchoring assemblies 12 are illustrated as the toggle bolt type polyaxial bone-screw 11 (FIG. 2) and the saddle type polyaxial bone-screw 13 (FIG. 3). Both types of polyaxial bone-screws are illustrated utilizing the linear engaging fastener 100 of the instant invention. ~~Figures Figure 4 through 6 show~~ shows the toggle type polyaxial screw assembly 11 with an associated support collar 18. The support collar 18 is constructed and arranged to engage the outer spherical surface 32 of the ~~[[of the]]~~ pedicle screw 20 when a clamping force is applied to the toggle bolt ~~[[42]]~~ 22. In addition to the support collar 18, each anchoring assembly 12 also includes a pedicle screw 20. As shown in Figures 4, 5 and 7, each pedicle screw 20 also includes a spherical end 28 spaced apart from the threaded end 26 by a neck portion 30. The exterior 32 of the pedicle screw spherical end 28 is preferably contoured for easy grasping. Within the toggle-type pedicle screw 11 the interior of the screw spherical end 28 forms a retention cavity 34, discussed below. The entrance 36 to the retention cavity 34 is characterized by a securing lip 38 that extends radially into the retention cavity 34.

Please replace the paragraph starting on page 21, line 19 with the

following rewritten paragraph:

Still referring to FIGS. 10 and 11, the linear tensile force and associated clamping force applied by an engaged linear fastener 100 on the toggle bolt machined end 42 forces relative longitudinal travel through the passthrough aperture ~~[[84]]~~ 48 and causes the toggle bolt spherical end 40 to be forced against the split retention ring 24 (FIGS. 4-9) reducing the gap 44. Further equal and opposite linear engagement on the collet 166 by compression ring 117 forms a substantially rigid fit between the toggle bolt 22 and the pedicle screw 20 without torque being applied to the flexible joint or the bone-screw interface. With the collet 116 compressed appropriately, the toggle bolt machined end 42 is locked in place with regard to the right-facing straight connector attachment flange 82, and the toggle bolt spherical end 40 is locked in place within the pedicle screw retention cavity 34. In this state, the split retention ring is sandwiched between the exterior of the toggle bolt ball end 40 and the conical interior of the retention cavity 34. Since the split retention ring 24 is locked within the retention cavity 34 by the retention cavity engagement lip 38, relative motion between the toggle bolt spherical end and the pedicle screw 20 is prevented once the toggle bolt machined end 42 is locked in place by the collet 116 and compression ring 117. This results in a rigid link between the right-facing straight connector and the anchoring assembly 12.

Please replace the paragraph starting on page 22, line 19 with the following rewritten paragraph:

Although the above description refers to joining an anchoring assembly 12 specifically to a right-facing straight connector [[52]], each of the one-piece connectors 14 and two-piece connectors 14' may be attached to an anchoring assembly in a similar manner. That is, right-facing offset connectors are attached by inserting a toggle bolt threaded end through the associated passthrough aperture; left-facing offset connectors are joined with an anchoring assembly by inserting a toggle bolt threaded end through an associated passthrough aperture; and left-facing straight connectors are attached to anchoring assemblies by inserting a toggle bolt threaded end through an associated passthrough aperture. In each case, the exterior connectors 120 of the inserted toggle bolt threaded end 42 are held in place by a compressed collet 116, as described previously.

Please replace the paragraph starting on page 23, line 10 with the following rewritten paragraph:

Now with reference to Figures 10 and 11, alternate embodiments of an anchoring assembly 12' are shown with the linear compression tool 112 in place securing the toggle bolt 22' to pedicle screw 20'. In one of these embodiments, the toggle bolt 22' has an extension with a groove 123 beyond the threaded end 42' which serves as a bit to be connected to a linear compression tool 112, shown in Fig. [[10]] 11. A collet 116 is placed about the threaded end 42'. The collet 116 has a cooperating internal surface 118 matching the configuration of the machined end [[42]] 42'. The outer surface of the collet is tapered with a larger base resting on the flange 82. The

groove 123 is connected to the tool 112 in a manner to apply linear force in a direction away from the screw 20'. The linear compression tool has an outer barrel 202 telescopically surrounding the extension 201. The tool 112 applies an equal and opposite linear force to the barrel and groove, simultaneously. The barrel 202 engages the tapered compression ring 117 to force the compression ring 117 over the collet 116 thereby completing a rigid compression fit. The toggle bolt ~~[[22]]~~ 22' may be constructed having an integrally formed extension with a frangible area (not shown) adjacent the machined end 42' or alternatively a threaded stem may be secured to the threaded internal cavity 122. Once the linear engagement is secured, the barrel of the tool 112 can be used to sever the extension or the threaded stem may be removed manually.

Please replace the paragraph starting on page 24, line 11 with the following rewritten paragraph:

The collet member 116 shown in Figures 12 through 14~~[[,]]~~ is slid or loosely threaded over the external machined end 42 of the linking member 22 or a U-shaped saddle member 150 generally shown in Figures 4 through 6. To facilitate compression, the collet member is provided with at least one slot 128 extending completely through the collet and preferably includes a plurality of partial slots 130. The external surface ~~[[120]]~~ 121 of collet member 116 is tapered or conical in form. The internal gripping surface 118 of collet member 116 is generally constructed and arranged to have a conjugate surface to the machined surface 42 of the linking member 22 or the U-shaped saddle member 150 for cooperative engagement therebetween. In

addition, the internal gripping surface 118 of the collet member may be constructed and arranged to exert a tensile force on the toggle or saddle members when compressed. This construction allows precise clamping forces to be applied to an assembly, allows full surface engagement between the toggle or saddle member and the collet member, and facilitates a locking connection without inserts or adhesives. The collet member 116 may also include a flared base 82 suitable to distribute a clamping force over a wide area or provide a load bearing surface for adjacent components.

Please replace the paragraph starting on page 25, line 9 with the following rewritten paragraph:

Referring to figures 15-18, ~~[[The]]~~ the compression ring 117, shown in Figures 15 through 17, has a tapered interior surface 122 which is complementary to the taper of collet member 116. The compression ring 117 may be constructed with a flange 124 about the upper surface. The flange 124 may have optional lugs ~~[[124]]~~ 125 formed in a C-shape for engaging an extractor (not shown) used to remove or disconnect the coupling. The flange may also have optional wrench flats 126 for engaging wrenches and/or sockets that are well known in the art.